

Potential Outcomes of Integrating Cattle and Cropping Systems in Southeastern Major Land Resource Areas

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Abstract

Crop rotations that use sod-based crops have been used for many years for various reasons. Beginning as a method to control soil erosion and build fertility, crop rotations have also been used to aid in parasite and pest control and more recently as improving the soil environment by increasing the soil carbon content. This paper investigates what would happen if currently cropped land were converted to pastureland as part of a sod-based crop rotation system. Land in the Southern Coastal Plain and the Southern Piedmont Major Land Resource Areas (MLRA) was identified together with cropping data from the 1997 Agricultural Census to provide recent cropping trends and statistics related to crop production. We then selected five crop scenarios using corn, cotton, peanut, soybean, and tobacco production and calculated the impact of converting 10% of cropland acres to pasture and beef cattle production. For the Southern Coastal Plain, if 10% of corn, cotton, peanut, soybean, and tobacco acres were converted to beef production there would be an increase of 71,429, 133,807, 48,690, 103,461, and 9,700 beef cows, respectively. In the Southern Piedmont, if 10% of corn, cotton, peanut, soybean, and tobacco acres were converted to beef production, there would be an increase of 13,619, 6,799, 1,265, 26,143, and 10,778 beef cows, respectively. Thus there would be 39.7% increase in numbers of beef cows in the Southern Coastal Plain as compared to a 6.6% increase in the Southern Piedmont. This illustrates that the potential impact on beef cow numbers would be much greater in the Southern Coastal Plain MLRA. If one were to examine acreage, production, and dollar changes associated with each of the five crops, with the exception of tobacco, the magnitude of change associated with a conversion of 10% of the cropland to pasture would be much greater in the Southern Coastal Plain than in the Southern Piedmont. There are other benefits associated with conversion of cropland to pasture such as the sequestration of organic carbon. This conversion would not only result in substantial sequestration of soil organic carbon, it could beneficially impact water infiltration, rooting depth, soil microbial activity and biomass, and water stable aggregates, all of which could enhance crop production in the rotation.

Keywords: crop rotation, Southern Coastal Plain Major Land Resource Area, Southern Piedmont Major Land Resource Area, beef cattle, land use

Introduction

The use of crop rotation systems involving sod-based crops probably had their origin in preventing soil erosion and building soil fertility (Buyanovsky, et al., 1997). Since those early motivations for crop rotation, other reasons developed including enhancement of soil carbon as influenced by crop culture and tillage (Bruce and Langdale, 1997) and the use of sod-based systems including grazing (Franzluebbers, et al., 2001). Other motivations have included pesticide resistance and the occurrence of various diseases associated with crop production. Integrated pest management considerations have played a role in the use of various cattle/cropping systems. In addition, economic considerations have entered the decision process as well as the overall sustainability of farming operations. It is apparent that there are many possible bases for using crop rotations that involve sod-based crops.

It is the objective of this report to summarize the characteristics of the Southern Piedmont and Southern Coastal Plain Major Land Resource Areas (MLRAs), trends that are occurring in these

areas and to develop several scenarios that illustrate what could result if land currently devoted to various crops were converted to cattle/cropping systems.

Materials and Methods

The Southern Piedmont and Southern Coastal Plain MLRAs are shown in Figure 1. This information was obtained from Natural Resources Conservation Service (NRCS), National Soil Survey Center, Lincoln, Nebraska (Sharon W. Waltman, Soil Scientist-Soil Geography, personal communication). These MLRA data are based on the “vintage” MLRA data. The NRCS is in the process of redefining MLRAs. We decided to use the vintage data because these were the areas in place during the 1987, 1992, and 1997 censuses.

General descriptions of the MLRAs discussed were obtained from Natural Resources Conservation Service (NRCS, 1981).

Current trends for agriculture in the two MLRAs were determined by examining data from the 1997 Census of Agriculture which gives data for the 1987, 1992, and 1997 censuses (USDA, 1999). In order to compile the data by MLRA, data were retrieved from information for each county in the MLRA. For counties that were only partially in a particular MLRA, that portion in a specific county was obtained from NRCS (Sharon W. Waltman, Soil Scientist-Soil Geography, personal communication). The percentage of a county in a specific MLRA was multiplied by the value for the entire county. For example, 16.5% of Fauquier County, Virginia lies in the Southern Piedmont MLRA. The Census indicates that there are 957 farms in Fauquier County. To estimate the number of farms in Fauquier County that are in the Southern Piedmont, we multiplied the number of farms by .165 to give 157.9 farms.

Scenarios were compiled illustrating potential outcomes if ten percent of the corn, cotton, peanut, soybean, and tobacco acreage were converted to pastureland for both the Southern Coastal Plain and Southern Piedmont MLRAs. The ten percent figure was chosen because it represents a very realistic level, and it presents a variety of options for producers who may wish to convert 10% of their cropland acres to a sod-based crop in each of 5 years with the land returning to crop production after 5 years of pasture, leaving a minimum of 50% of a given farm in crop production at any one time after completion of the initial 5-year period. For cost analyses purposes, it was assumed that the cost of establishment of bermudagrass and tall fescue were the same at \$220.04/acre. It was assumed that the pastureland would be in place for at least 5 years resulting in an amortized annual cost of \$44.04/acre. The costs associated with cow/calf production were derived by J. C. McKissick, Extension Agricultural Economics Department, University of Georgia, for North Georgia (1994).

Assumptions and changes associated with a ten percent conversion of corn to pasture are given in Table 3, cotton in Table 4, peanuts in Table 5, soybeans in Table 6, and tobacco in Table 7. The land areas and production amounts for each crop were derived from the 1997 Census of Agriculture. The crop enterprise costs were derived from a report by Givan and Shurley (1998). It was assumed that 1.5 acres of pasture would be required for one cow/calf unit on a year around basis. We assumed that the pasture forage of choice would be either bermudagrass or tall fescue

or a combination of the two grasses depending upon the site characteristics. One could select other pasture perennials including both grasses and legumes for establishment.

Franzluebbers et al. (2001) reported that soil organic carbon could be sequestered at a rate of approximately 6,230 lb/acre during a 5-year period following conversion from continuous cropping to bermudagrass sod which was grazed each year for 140 days from mid May to early October.

The scenarios presented do not account for external impacts such as government or other programs. In addition, the scenarios were not intended to cover all potential outcomes, but selected outcomes to illustrate potential magnitudes of change that might occur if 10% of the land area in a particular crop were converted to pasture in either the Southern Coastal Plain or Southern Piedmont MLRAs.

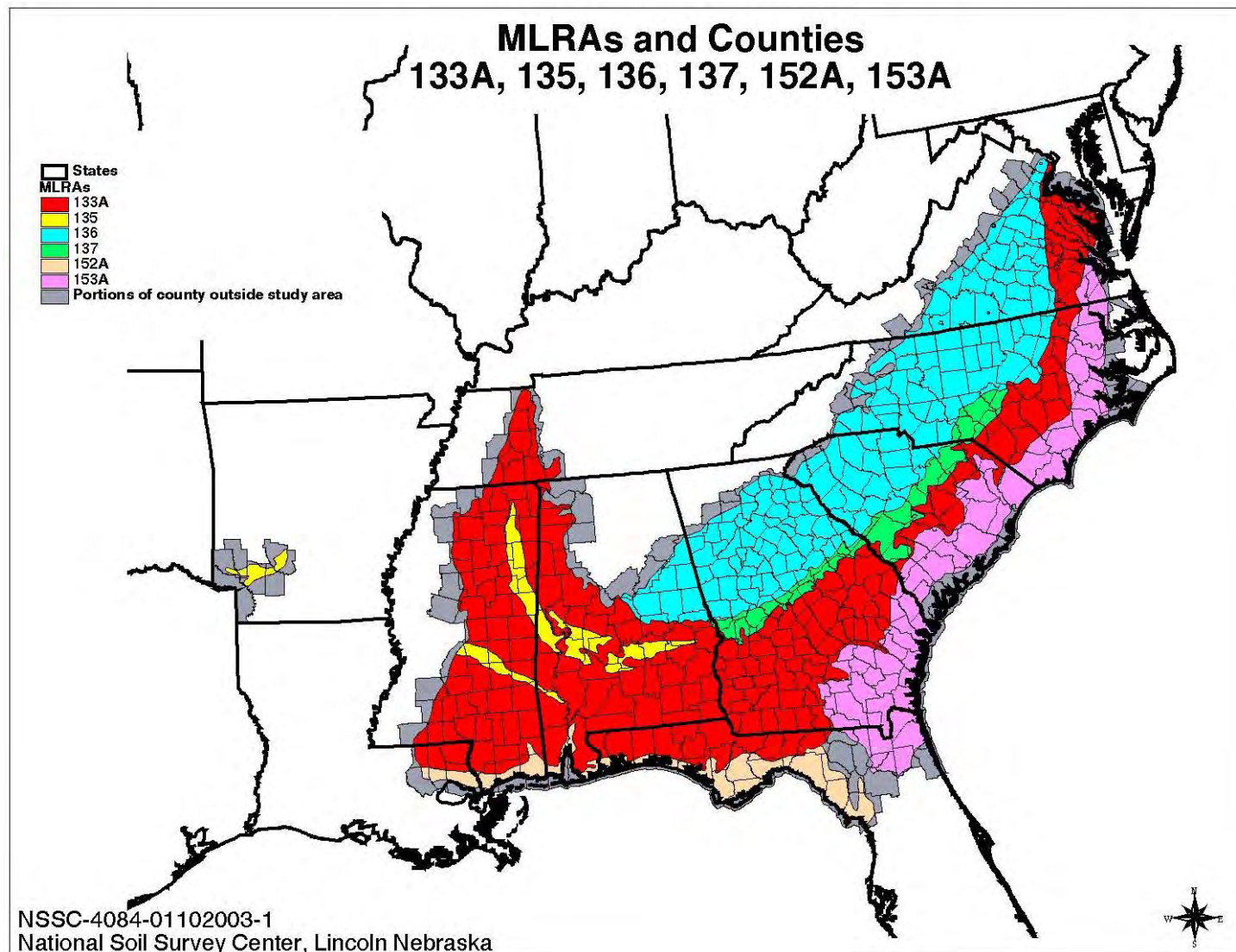


Figure 1
The Southern Coastal Plain is Major Land Resource Area (MLRA) 133A and Southern Piedmont is MLRA 136.

Results and Discussion

Description of Southern Coastal Plain

The Southern Coastal Plain (MLRA 133A) includes parts of ten states, including Alabama, Florida, Georgia, Louisiana, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia and covers approximately 110,058 sq. miles.

This area is about 69% woodland, 17% cropland, and 11% pastureland. About 3% of the area is used for rangeland, urban development, or other purposes. The woodland is 65 to 75% privately owned and 25 to 35% industry owned. A small percentage is federally owned. Timber production is important. Cash crops include soybeans, corn, peanuts, and cotton. Major vegetable crops, melons, tobacco, and pecans are important in some parts. Pastures are used mostly for beef cattle, but some dairy cattle and hogs are raised. Controlling soil erosion and improving drainage on low wetland areas are major management concerns.

Elevation ranges from 82 to 656 feet, increasing gradually from the lower Coastal Plain northward. The area is strongly dissected into nearly level and gently undulating valleys and gently sloping to steep uplands that are underlain by unconsolidated sand, silt, and clay. Stream valleys generally are narrow in their upper reaches but become broad and have widely meandering stream channels as they approach the coast. Local relief is mainly a few feet, but in some of the more deeply dissected areas relief is 82 to 164 feet.

Average annual precipitation ranges from 40 inches in the north to 60 inches in the south. Minimum precipitation is in autumn throughout the area. In the east maximum precipitation is in midsummer, and in the west it is in winter and in spring. Average annual temperature is 61 to 68 F, increasing from north to south. Average freeze-free period 200 to 280 days, increasing from north to south.

Precipitation, perennial streams, and groundwater provide an abundance of water. Domestic water supplies are obtained mainly from shallow wells and water for livestock from perennial streams and small farm ponds. In most places, one or more aquifers provide ample ground water for municipal and industrial uses. The many perennial streams have the potential for supplying water for municipal use, human consumption, and farming but have been little used for these purposes. A few large reservoirs are available for recreation and other uses (NRCS, 1981).

Farming trends in Southern Coastal Plain

In general, the number of farms has declined while the number of acres/farm has been increasing in the Southern Coastal Plain (Table 1). Most crop production has declined since 1987 even though yields/acre have increased; however, some enterprises are booming. Cotton, hay, tobacco, wheat, and vegetables are all on the increase plus broiler and meat-type chicken production. The distribution of size of farms has changed also. The number of large farms (>1,000 acres) has increased 5.3 % since 1987 but the number of smaller farms (10 to 179 acres) increased 5.1 % since 1992. Values described here were taken from the 1997 Census of Agriculture, which gave values for the last three censuses, i.e., 1987, 1992, and 1997.

The number of farms declined 7,311 from 1987-1992 but then increased 598 from 1992-1997. The increase occurred in farms ranging in size of 10-49 acres, which increased 518 (3.3%), farms of 50-179 acres which increased by 483 (1.8%) and farms greater than 1,000 acres which increased by 214 (5.4%) from 1992-1997. The amount of land in farms declined 1,273,145 (5.9%) acres from 1987-1992 but increased 721,181 (3.6%) acres from 1992-1997. The average size of farm increased from 263.8 acres/farm in 1987 to 273.8 acres/farm in 1992 and 281.2 acres/farm in 1997.

The number of farms with cropland has declined 10.1% from 1987-1992 and 4.8% from 1992-1997 while cropland acres declined about 5% during each period. Acres of harvested cropland increased slightly, .4% from 1987-1992 and 4.4% for 1992-1997 while the number of farms with cropland declined 10% to 11% for each census period.

Amount of irrigated land acres has increased since 1987, 8.8% from 1987 to 1992 and 3.4% from 1992 to 1997. The number of farms with irrigated land has declined 8%-9% during each census period. Number of farms with orchards increased 5.6% from 1987-1992 but then declined 21.6% during 1992-1997. The number of orchard acres increased slightly from 1987-1992 but then decreased 34.7% during 1992-1997.

Broiler and meat-type chicken production has increased since 1987. The number of farms growing broilers increased 18.5% since 1987 while the number chickens sold increased 95.7% since 1987. Production appears to be increasing at an increasing rate because there was an increase in the number of chickens sold of 34.9% during 1987-1992 and a 45% increase from 1992-1997.

The number of beef cattle farms declined 5% during 1987-1992 and decreased an additional 2.7% in 1992-1997. The number of beef cows increased about 1% in 1987-1992 but declined 10.5% in 1992-1997. Number of farms that sold cattle and calves declined 10.5% during 1987-1992 but then remained steady from 1992-1997. The number of cattle and calves sold declined 14% from 1987-1992 but increased 5.8% for 1992-1997. Farms averaged 26.1 head of beef cows/farm in 1997, 28.9 cows/farm in 1992 and 27.2 cows/farm in 1987.

Pastureland (all types) declined 5.3% for 1987-1992 and further declined 7.9% in 1992-1997. The number of farms with pastureland declined 1.6% in 1987-1992 and about 1% from 1992-1997. Acres of cropland used only for pasture increased 4.9% for 1987-1992 and fell 8.5% for 1992-1997. The number of farms with cropland pasture fell 1.9% for 1987-1992 and 3.5% for 1992-1997. Acres of woodland used for pasture declined 24.9% from 1982 to 1997 and the number of farms with woodland used as pasture declined about 10% during each census period.

The number of farms growing corn declined 28.8% for 1987-1992 and 32.6% for 1992-1997 while the number of acres of corn increased 10% and declined 26.6% during the same respective census periods. Bushels of corn produced increased by 43.2% in 1987-1992 and declined 26.6% in 1992-1997. Yield/acre has increased during the census periods where corn yields were 71.5 bu/acre in 1987, 93.1 bu/acre 1992, and 93.2 bu/acre in 1997.

Cotton production has been increasing in the Southern Coastal Plain. Number of farms growing cotton increased 35.5% since 1987, acres of cotton has increased 2.3 fold and the number of bales of cotton increased 2.5 fold since 1987.

Hay production has increased while the number of farms growing hay has remained steady. Tons of hay increased 21.7% for 1987-1992 and 17.9% for 1992-1997 while the number of acres of hay increased 3.5% for 1987-1992 and 9.9% for 1992-1997.

Peanut production has declined with a 19.9% reduction in acres, 25.7% reduction in number of farms growing peanuts and a 29% decrease in pounds of peanuts harvested.

Rice production is not significant in the Coastal Plain (3.92 farms, 1,157 acres) but rice production and the number of acres growing rice has increased 1.75 fold and pounds of rice increased 3.56 fold since 1987.

Sorghum production declined since 1987 with a 97% reduction in acres of sorghum, 98% reduction in bushels of sorghum harvested and a 92% decline in the number of farms growing sorghum.

Soybean production has declined since 1987 with a 31% reduction in acres growing soybeans, 25% decrease in bushels of soybeans harvested and 47% decline in the number of farms growing soybeans.

Tobacco production has increased although there has been a 48% reduction in the number of farms but a 32% increase in the number of acres growing tobacco and a 42% increase in the pounds of tobacco harvested.

The number of acres growing wheat declined 14.6% for 1987-1992 but increased by 10% from 1992-1997 while the number of farms growing wheat decreased 45% since 1987. Bushels of wheat produced increased 31.9% since 1987 and yield has increased from 34.2 bu/acre in 1987, 45.4 bu/acre in 1992 and 48 bu/acre in 1997.

Trends in vegetable production in the Southern Coastal Plain are unclear from the census. From 1987-1992, the number of acres used in vegetable production increased 19.8% but then declined 6.8% from 1992-1997. The number of farms growing vegetables increased 2.9% from 1987-1992 but then decreased 21% by 1997.

Trends for Five Selected Crops in the Southern Coastal Plains

Production of the five crops described in this paper has generally been increasing during the 10 years between agricultural censuses, but the number of farms growing these crops has been declining and yields/acre have increased. For corn, there were 256,273 fewer acres of corn in 1997 than in 1987 or a 25% decrease. Also, 13,512 fewer farms grew corn in 1997 than in 1987, which gives a 52% decline. Production of corn/acre increased from about 71 bu./acre in 1987 to 93 bu./acre in 1997, which resulted in a 5.2% increase in corn produced from 1987 to 1997.

In contrast to corn, acres of cotton increased 2.35 fold, the number of farms growing cotton increased 35% and the number of bales of cotton increased 2.55 fold since 1987.

Peanut production has declined since 1987. The number of farms growing peanuts fell from 10,252 to 6,461 (37%) since 1987 while acres devoted to peanut production fell 10.9% and peanut production declined 13.9%.

Soybean production declined in the Coastal Plain since 1987. There were 46.4% fewer farms growing soybeans in 1997 than in 1987, 30.8% fewer acres growing soybeans and 24.6% fewer bushels of soybeans produced in 1997 than in 1987.

There were fewer farms (47%) growing tobacco in 1997 than in 1987, but the number of acres growing tobacco increased 32% and yields increased 43%. Tobacco produced/acre increased from 2,065 lb/acre to 2,231 lb/acre in 1997.

Table 1. Characteristics of Farms in the Southern Coastal Plain

Item	1997	1992	1987	% Change 92-97	% Change 87-92	% change 87-97
Farms (number)	74,627	74,029	81,341	0.8%	-9.0%	-8.3%
Land in farms (acres)	20,986,844	20,265,664	21,538,809	3.6%	-5.9%	-2.6%
Acres/farm	281	274	265	2.7%	3.4%	6.2%
Farms by size: 1 to 9 acres	3,703	4,074	4,764	-9.1%	-14.5%	-22.3%
Farms by size: 10 to 49 acres	16,203	15,685	17,494	3.3%	-10.3%	-7.4%
Farms by size: 50 to 179 acres	28,045	27,562	30,110	1.8%	-8.5%	-6.9%
Farms by size: 180 to 499 acres	16,561	16,615	18,380	-0.3%	-9.6%	-9.9%
Farms by size: 500 to 999 acres	5,771	5,972	6,468	-3.4%	-7.7%	-10.8%
Farms by size: 1,000 acres or more	4,345	4,121	4,124	5.4%	-0.1%	5.3%
Farms by value of sales: Less than \$2,500	25,562	20,217	23,077	26.4%	-12.4%	10.8%
Farms by value of sales: \$2,500 to \$4,999	10,174	10,622	12,428	-4.2%	-14.5%	-18.1%
Farms by value of sales: \$5,000 to \$9,999	9,672	10,469	11,705	-7.6%	-10.6%	-17.4%
Farms by value of sales: \$10,000 to \$24,999	9,219	10,654	11,649	-13.5%	-8.5%	-20.9%
Farms by value of sales: \$25,000 to \$49,999	4,204	5,656	6,476	-25.7%	-12.7%	-35.1%
Farms by value of sales: \$50,000 to \$99,999	3,587	4,581	5,641	-21.7%	-18.8%	-36.4%
Farms by value of sales: \$100,000 or more	12,209	11,830	10,365	3.2%	14.1%	17.8%
Total cropland (acres)	10,978,744	11,543,070	12,144,710	-4.9%	-5.0%	-9.6%
Total cropland (farms)	62,683	65,815	73,170	-4.8%	-10.1%	-14.3%
Total cropland, harvested cropland (acres)	7,616,458	7,292,471	7,262,152	4.4%	0.4%	4.9%
Total cropland, harvested cropland (farms)	48,887	54,827	61,936	-10.8%	-11.5%	-21.1%
Operators by principal occupation: Farming	32,361	35,490	38,223	-8.8%	-7.1%	-15.3%
Operators by principal occupation: Other	42,266	38,539	43,118	9.7%	-10.6%	-2.0%
Irrigated land (acres)	848,123	820,165	753,730	3.4%	8.8%	12.5%
Irrigated land (farms)	5,748	6,343	6,885	-9.4%	-7.9%	-16.5%
Land in orchards (acres)	6,229	9,533	9,290	-34.7%	2.6%	-33.0%
Land in orchards (farms)	532	680	644	-21.8%	5.6%	-17.4%
Beef cows (farms)	34,635	35,595	37,479	-2.7%	-5.0%	-7.6%
Beef cows (number)	923,889	1,028,974	1,018,989	-10.2%	1.0%	-9.3%
Cattle and calves sold (farms)	38,505	38,790	43,323	-0.7%	-10.5%	-11.1%
Cattle and calves sold (number)	1,205,398	1,138,924	1,324,168	5.8%	-14.0%	-9.0%
Broilers and other meat-type chickens sold (farms)	2,609	2,363	2,201	10.4%	7.4%	18.5%
Broilers and other meat-type chickens sold (number)	1,004,664,341	692,840,155	513,476,791	45.0%	34.9%	95.7%
Barley for grain (acres)	14	14	9	0.7%	54.1%	55.3%
Barley for grain (bushels)	687	957	533	-28.2%	79.5%	28.8%

Barley for grain (farms)	0	0	0	-2.7%	-22.9%	-25.0%
Corn for grain or seed (acres)	1,071,434	1,459,698	1,328,157	-26.6%	9.9%	-19.3%
Corn for grain or seed (bushels)	99,838,038	135,976,502	94,939,618	-26.6%	43.2%	5.2%
Corn for grain or seed (farms)	12,452	18,482	25,964	-32.6%	-28.8%	-52.0%
Cotton (acres)	2,007,101	1,053,683	599,872	90.5%	75.7%	234.6%
Cotton (bales)	2,616,238	1,460,190	737,633	79.2%	98.0%	254.7%
Cotton (farms)	6,345	4,985	4,674	27.3%	6.7%	35.7%
Hay-alfal,oth tame,small grain,wild,grass silage,green chop,etc tons	2,787,931	2,365,597	1,944,327	17.9%	21.7%	43.4%
Hay-alfalfa,other tame,small grain,wild,grass silage,green chop acres	1,176,155	1,070,378	1,034,579	9.9%	3.5%	13.7%
Hay-alfalfa,other tame,small grain,wild,grass silage,green chop farms	27,443	27,305	29,195	0.5%	-6.5%	-6.0%
Peanuts for nuts (acres)	730,351	912,239	819,975	-19.9%	11.3%	-10.9%
Peanuts for nuts (farms)	6,461	8,696	10,252	-25.7%	-15.2%	-37.0%
Peanuts for nuts (pounds)	1,731,653,013	2,439,911,343	2,010,065,665	-29.0%	21.4%	-13.9%
Rice (farms)	4	6	4	-30.1%	59.8%	11.7%
Rice (acres)	1,157	965	420	19.9%	129.6%	175.4%
Rice (hundredweight)	67,948	51,364	14,889	32.3%	245.0%	356.4%
Sorghum for grain or seed (acres)	904	13,017	27,979	-93.1%	-53.5%	-96.8%
Sorghum for grain or seed (bushels)	32,916	849,135	1,545,906	-96.1%	-45.1%	-97.9%
Sorghum for grain or seed (farms)	40	202	514	-80.2%	-60.7%	-92.2%
Soybeans for beans (acres)	1,551,914	1,703,647	2,242,039	-8.9%	-24.0%	-30.8%
Soybeans for beans (bushels)	36,795,955	45,960,936	48,811,818	-19.9%	-5.8%	-24.6%
Soybeans for beans (farms)	10,357	13,355	19,307	-22.4%	-30.8%	-46.4%
Tobacco (acres)	145,502	131,266	110,204	10.8%	19.1%	32.0%
Tobacco (farms)	3,837	5,611	7,329	-31.6%	-23.4%	-47.7%
Tobacco (pounds)	324,710,762	284,998,005	227,116,470	13.9%	25.5%	43.0%
Vegetables harvested for sale (acres)	8,344	8,953	7,472	-6.8%	19.8%	11.7%
Vegetables harvested for sale (farms)	251	318	309	-21.0%	2.9%	-18.8%
Wheat for grain (acres)	694,201	630,834	738,960	10.0%	-14.6%	-6.1%
Wheat for grain (bushels)	33,302,836	28,626,821	25,245,886	16.3%	13.4%	31.9%
Wheat for grain (farms)	5,221	5,926	9,571	-11.9%	-38.1%	-45.4%
Farms (number)	74,627	74,029	81,341	0.8%	-9.0%	-8.3%
Land in farms (acres)	20,986,844	20,265,664	21,538,809	3.6%	-5.9%	-2.6%
Pastureland, all types (acres)	5,159,765	5,604,669	5,916,157	-7.9%	-5.3%	-12.8%
Pastureland, all types (farms)	48,222	48,661	52,680	-0.9%	-7.6%	-8.5%
Total cropland, cropland used only for pasture or grazing (acres)	2,165,997	2,367,774	2,256,216	-8.5%	4.9%	-4.0%
Total cropland, cropland used only for pasture or grazing (farms)	32,616	33,796	34,446	-3.5%	-1.9%	-5.3%
Total woodland, woodland pastured (acres)	1,331,485	1,583,706	1,772,980	-15.9%	-10.7%	-24.9%
Total woodland, woodland pastured (farms)	19,678	21,987	24,912	-10.5%	-11.7%	-21.0%

Description of the Southern Piedmont

The Southern Piedmont (MLRA 136) contains parts of five states, Alabama, Georgia, North Carolina, South Carolina, and Virginia and covers an area of 62,328 sq. miles.

Most of this area is in small farms, but a sizable acreage is controlled by woodland companies. Land adjacent to major cities is used for residences and associated urban development. Although most of the land was once cultivated, much has reverted to mixed stands of pine and hardwoods. Most of the open land is pasture, but some crops, such as soybeans, small grain, corn, cotton, wheat, and, to a lesser extent, tobacco, are grown. Dairy cattle and poultry are important locally.

Elevation ranges from 328 to 1,312 feet. Drainage patterns are well defined. Streams have dissected the original plateau, leaving narrow to fairly broad upland ridgetops and short slopes adjacent to the major streams. The valley floors generally are narrow and make up about 10 percent or less of the land area. The associated stream terraces are minor.

Average annual precipitation is 45 to 55 inches. Precipitation is evenly distributed throughout the year, but the lowest is in autumn; snowfall is light. Average annual temperature is 57 to 64 F. Average freeze-free period—205 to 235 days.

Precipitation, perennial streams, and lakes provide an abundance of water. Ground-water supplies are relatively small, but shallow and deep wells are the principal sources of water for domestic use. Small farm ponds are an important source of water for livestock.

The uplands generally support hardwood and pine forest vegetation. Loblolly pine, slash pine, white oak, red oak, gum, yellow poplar, and sycamore are principal species; pine is dominant on eroded sites. Hardwoods or mixed stands of pine and hardwoods are on slightly eroded soils and stream flood plains. Dogwood, honeysuckle, pinehill bluestem, briars, and other grasses and forbs characterize the understory. (NRCS, 1981)

Farming Trends in the Southern Piedmont.

Overall, the number of farms has declined while the size of farms has increased in the Southern Piedmont (Table 2). Large farms are getting larger while small farms are being eliminated. The number of beef cows has increased while acres of pastureland have declined and acres of cropland used for pasture has increased slightly. Trends in irrigated acres are not clear from census data because one census period shows a decline while the next census shows an increase. Some enterprises, i.e., broilers and meat-type chickens, corn, cotton, wheat and tobacco are increasing. Values described here were taken from the 1997 Census of Agriculture, which gave values for the last three censuses, i.e., 1987, 1992, and 1997.

The number of farms has declined by 5,841 (8.3%) since the 1987 census with the greatest decline occurring from 1987 to 1992. Farm size has increased 3.8% since 1987 with an average of 166 acres/farm in 1997. All farm sizes did not decline at the same rate, however. The number of farms with 10 to 49 acres increased 3.4% and large farms (>1,000 acres) increased 10.8% in 1997. Farms with 1 to 9 acres declined 21% since 1987.

The number of farms with cropland and the number of cropland acres declined 10.8% and 3.1%, respectively, since 1987, but the greater portion of the decrease occurred in from 1987 to 1992. The number of cropland acres and harvested cropland acres increased .7% and 5.3%, respectively, from 1992 to 1997 while number of farms with harvested cropland declined 4%. The number of irrigated acres

showed opposite trends between censuses. There was a 22.2% decline in irrigated acres from 1987 to 1992 but a 29.4% increase in 1992-1997, resulting in a net change of .6% since 1987. The number of farms irrigating declined 26.5% since 1987 with the bulk of the change occurring from 1987 to 1992 (29.2%).

The number of farms with orchards and the number of orchard acres both declined since 1987. Number of farms declined 47.8% while number of farms decreased 29% with the bulk of the decrease occurring from 1992 to 1997.

The number of beef cows increased 13.9% from 1987-1992 and 3% from 1992-1997 while the number of farms with beef cattle declined 7.3% since 1987. The number of cattle and calves sold decreased 6.4% from 1987-1992 but increased 8% in 1992-1997 with a net increase of 1.1% since 1987 while the number of farms selling cattle and calves decreased 9% since 1987. The number of farms with broilers and meat-type chickens decreased 15.9% since 1987 but the number of chickens sold increased 44.2% since 1987 with similar increases each census period.

Number of farms with pastureland decreased 7.2% since 1987 with most of the decline occurring from 1987-1992, while the acres of pastureland declined about 3.7% during each census period. Acres of cropland used only for pasture increased 6.9% since 1987 while the number of farms with pastured cropland remained steady. Pastured woodland acres decreased 21% since 1987 and the number of farms with pastured woodland declined 16.5% since 1987.

Corn acres declined about 12% during each census period with a 22.5% decline since 1987 while corn yield increased 27.2% with a 43% increase from 1987-1992 and an 11.1% decrease from 1992-1997. The number farms growing corn decreased 57.4% since 1987.

Cotton production (number of bales) increased 2.46 times since 1987 with a 94% increase from 1987-1992 and a 78% increase from 1992-1997. Cotton acres increased 2.2 times since 1987 with similar increases in each census period. Number of farms growing cotton increased 26% since 1987 with 12% increases each census period.

The number of farms growing hay declined 7% since 1987 with a slight 3.2% increase from 1987-1992. Number of acres of hay increased 1.4% from 1987-1992 and 14.8% from 1992-1997 while the number of tons of hay increased 40.8% since 1987.

Peanut production generally has declined with a 42.3% reduction in the number of farms, 14% decline in peanut acres and 14% decrease in pounds of harvested nuts since 1987.

Acres of tobacco increased 36% and pounds of tobacco increased 52.8% since 1987 while the number of farms growing tobacco decreased 42.8% since 1987.

Wheat production (bushels) increased 38.4% and the number of acres of wheat increased 2.3% since 1987 but the number of farms growing wheat declined nearly 40% since 1987.

Trends for Five Selected Crops in the Southern Piedmont

As in the Southern Coastal Plain, production of the five crops used in this paper has been generally increasing, although the number of farms growing these crops has been declining. There were 57.4% fewer farms growing corn in 1997 than in 1987 with a 22.5% reduction in the number of acres growing

corn. Corn production increased from 51 bu./acre in 1987 to 84 bu./acre in 1997 resulting in a 27% increase in corn bushels produced since 1987.

Similar to the Coastal Plain, cotton production has increased in the Southern Piedmont. The number of farms growing cotton increased from 305 in 1987 to 384 in 1997, a 26.2% increase. Also, there were 2.2 times more cotton acres in 1997 than in 1987 and 2.46 times more cotton bales produced.

Peanut production in the Southern Piedmont is not as large as in the Coastal Plain. There was a 42.3% reduction in the number of farms growing peanuts, 14.4% decline in the number of acres growing peanuts and 14.3% decline in pounds of peanuts produced from 1987 to 1997.

As with peanuts, soybean production is less in the Southern Piedmont than the Coastal Plain. The number of farms growing soybeans fell 42.9% and the number of acres growing soybeans decreased 7.9% while soybean production increased 13.2% from 1987 to 1997. Soybean yields increased from 20 bu./acre in 1987 to 24 bu./acre in 1997.

Tobacco production in the Southern Piedmont is greater than the Coastal Plain. Even though the number of farms declined 42.8% from 1987 to 1997, the number of acres growing tobacco increased 36.2% and tobacco production increased 52.8% from 1987 to 1997.

Table 2. Characteristics of Farms in the Southern Piedmont

Item	1997	1992	1987	% Change 92-97	% Change 87-92	% Change 87-97
Farms (number)	64,381	64,452	70,222	-0.1%	-8.2%	-8.3%
Land in farms (acres)	10,674,954	10,488,143	11,213,928	1.8%	-6.5%	-4.8%
Acres/farm	166	163	160	1.9%	1.9%	3.8%
Farms by size: 1 to 9 acres	3,695	4,135	4,672	-10.6%	-11.5%	-20.9%
Farms by size: 10 to 49 acres	18,595	17,990	19,565	3.4%	-8.1%	-5.0%
Farms by size: 50 to 179 acres	26,341	26,549	29,204	-0.8%	-9.1%	-9.8%
Farms by size: 180 to 499 acres	11,461	11,540	12,387	-0.7%	-6.8%	-7.5%
Farms by size: 500 to 999 acres	2,940	3,021	3,115	-2.7%	-3.0%	-5.6%
Farms by size: 1,000 acres or more	1,349	1,217	1,279	10.8%	-4.8%	5.5%
Farms by value of sales: Less than \$2,500	22,282	20,459	24,564	8.9%	-16.7%	-9.3%
Farms by value of sales: \$2,500 to \$4,999	10,460	10,665	11,921	-1.9%	-10.5%	-12.3%
Farms by value of sales: \$5,000 to \$9,999	9,465	9,860	10,529	-4.0%	-6.4%	-10.1%
Farms by value of sales: \$10,000 to \$24,999	8,231	8,654	8,775	-4.9%	-1.4%	-6.2%
Farms by value of sales: \$25,000 to \$49,999	3,586	4,146	3,914	-13.5%	5.9%	-8.4%
Farms by value of sales: \$50,000 to \$99,999	2,485	3,025	3,185	-17.9%	-5.0%	-22.0%
Farms by value of sales: \$100,000 or more	7,872	7,642	7,334	3.0%	4.2%	7.3%
Total cropland (acres)	5,196,413	5,160,684	5,363,189	0.7%	-3.8%	-3.1%
Total cropland (farms)	55,426	56,234	62,150	-1.4%	-9.5%	-10.8%
Total cropland, harvested cropland (acres)	2,575,425	2,446,768	2,565,365	5.3%	-4.6%	0.4%
Total cropland, harvested cropland (farms)	43,322	45,122	51,143	-4.0%	-11.8%	-15.3%
Operators by principal occupation: Farming	27,417	29,091	30,392	-5.8%	-4.3%	-9.8%
Operators by principal occupation: Other	36,965	35,361	39,830	4.5%	-11.2%	-7.2%
Irrigated land (acres)	125,107	96,714	124,351	29.4%	-22.2%	0.6%
Irrigated land (farms)	4,949	4,770	6,737	3.8%	-29.2%	-26.5%
Land in orchards (acres)	18,967	30,376	36,358	-37.6%	-16.5%	-47.8%
Land in orchards (farms)	751	1,006	1,058	-25.3%	-5.0%	-29.0%
Beef cows (farms)	35,371	36,411	38,162	-2.9%	-4.6%	-7.3%
Beef cows (number)	887,358	861,844	756,881	3.0%	13.9%	17.2%
Cattle and calves sold (farms)	38,654	38,950	42,476	-0.8%	-8.3%	-9.0%
Cattle and calves sold (number)	956,805	885,746	946,175	8.0%	-6.4%	1.1%

Broilers and other meat-type chickens sold (farms)	2,922	3,134	3,474	-6.7%	-9.8%	-15.9%
Broilers and other meat-type chickens sold (number)	1,003,147,503	825,589,808	695,502,183	21.5%	18.7%	44.2%
Corn for grain or seed (acres)	204,286	233,403	263,602	-12.5%	-11.5%	-22.5%
Corn for grain or seed (bushels)	17,325,268	19,483,085	13,625,577	-11.1%	43.0%	27.2%
Corn for grain or seed (farms)	4,577	6,825	10,735	-32.9%	-36.4%	-57.4%
Cotton (acres)	101,979	59,215	31,886	72.2%	85.7%	219.8%
Cotton (bales)	118,850	66,739	34,347	78.1%	94.3%	246.0%
Cotton (farms)	384	342	305	12.4%	12.2%	26.2%
Hay-alfal,oth tame,small grain,wild,grass silage,green chop,etc(tons,dry)	2,594,610	2,283,222	1,842,893	13.6%	23.9%	40.8%
Hay-alfalfa,other tame,small grain,wild,grass silage,green chop,etc(acres)	1,323,881	1,152,872	1,136,633	14.8%	1.4%	16.5%
Hay-alfalfa,other tame,small grain,wild,grass silage,green chop,etc(farms)	33,106	32,067	35,626	3.2%	-10.0%	-7.1%
Peanuts for nuts (acres)	18,980	22,133	22,179	-14.2%	-0.2%	-14.4%
Peanuts for nuts (farms)	204	265	354	-23.1%	-25.0%	-42.3%
Peanuts for nuts (pounds)	44,780,868	59,388,290	52,262,982	-24.6%	13.6%	-14.3%
Soybeans for beans (acres)	392,151	393,480	425,759	-0.3%	-7.6%	-7.9%
Soybeans for beans (bushels)	9,483,751	9,876,145	8,377,544	-4.0%	17.9%	13.2%
Soybeans for beans (farms)	4,126	5,328	7,225	-22.6%	-26.3%	-42.9%
Tobacco (acres)	161,664	145,325	118,715	11.2%	22.4%	36.2%
Tobacco (farms)	6,467	8,858	11,302	-27.0%	-21.6%	-42.8%
Tobacco (pounds)	346,561,819	303,445,619	226,871,870	14.2%	33.8%	52.8%
Wheat for grain (acres)	266,130	272,795	260,045	-2.4%	4.9%	2.3%
Wheat for grain (bushels)	12,599,092	11,362,747	9,104,084	10.9%	24.8%	38.4%
Wheat for grain (farms)	4,374	6,064	7,278	-27.9%	-16.7%	-39.9%
Pastureland, all types (acres)	3,988,549	4,142,584	4,306,999	-3.7%	-3.8%	-7.4%
Pastureland, all types (farms)	48,681	48,926	52,444	-0.5%	-6.7%	-7.2%
Total cropland, cropland used only for pasture or grazing (acres)	2,059,185	2,054,825	1,926,676	0.2%	6.7%	6.9%
Total cropland, cropland used only for pasture or grazing (farms)	35,385	35,203	35,620	0.5%	-1.2%	-0.7%
Total woodland, woodland pastured (acres)	985,941	1,087,623	1,254,978	-9.3%	-13.3%	-21.4%
Total woodland, woodland pastured (farms)	23,568	24,940	28,233	-5.5%	-11.7%	-16.5%

Crop Scenarios

For corn (Table 3), cotton (Table 4), peanuts (Table 5), and soybeans (Table 6), it is apparent that a 10% conversion to pasture would result in a much greater change in acreage and production in the Southern Coastal Plain than in the Southern Piedmont MLRA. Tobacco is the only crop of the five crops evaluated that had more acres and production in the Southern Piedmont than the Southern Coastal Plain.

If 10% of each of the cropland acres in corn, cotton, peanuts, soybeans, and tobacco were converted to pastureland in the Southern Coastal Plain there would be an increase of 71,429; 133,807; 48,690; 103,461; and 9,700 beef cows, respectively, in the MLRA. This is a total of 367,087 beef cows, which represents a 39.7 percent increase in the number of beef cows currently in the resource area. If 10% of the cropland acres in corn, cotton, peanuts, soybeans, and tobacco were converted to pastureland in the Southern Piedmont there would be an increase of 13,619; 6,799; 1,265; 26,143; and 10,778 beef cows, respectively, in the MLRA. This is a total of 58,604 beef cows, which represents only a 6.6 percent increase in the number of beef cows in the resource area. This contrast illustrates that potential impact in terms of beef cow numbers could be much greater in the Southern Coastal Plain MLRA.

If one were to examine acreage, production and dollar changes associated with each of the five crops, with the exception of tobacco, the magnitude of change associated with a conversion of 10% of the cropland to pasture would be much greater in the Southern Coastal Plain than in the Southern Piedmont. Consequently, if one examined certain input items that were specifically associated with one of those crops, e.g., defoliate in cotton production, the 10% reduction would result in over a three million dollar reduction in the defoliate used in the Southern Coastal Plain. This example was selected because there is growing concern over chemical use in agricultural production. Although chemicals such as herbicides, insecticides, and anthelmintics are used in beef cow production, they are typically used at lower levels than what might be associated with crop production.

There are other benefits associated with conversion of cropland to pasture such as the sequestration of organic carbon. If 10% of each of the cropland acres in corn, cotton, peanuts, soybeans, and tobacco were converted to pastureland in the Southern Coastal Plain there would be an increase in soil organic carbon of 667,503,382; 1,250,423,923; 455,008,673; 966,842,422; and 90,647,746 lb., respectively, or a total increase over a five-year period of 1,715,213 tons. This would not only result in substantial sequestration of soil organic carbon, it could beneficially impact water infiltration, rooting depth, soil microbial activity and biomass, and water stable aggregates.

Another benefit could be diversification, improved use of labor and total resource base plus the spreading of economic risk factors. It could also enable producers to better utilize crop byproducts, e.g., the grazing of corn or cotton stalks following crop harvest.

Implications and Conclusions

This study illustrates that additional flexibility and increased potential exists for cropland improvement when producers add a sod-based crop rotation to their operations. Including

pasture and beef cattle can remedy crop disease and pest problems and has the potential to reduce chemical use while improving soil characteristics. Also, the magnitude of these improvements probably will differ according to the major land use area and other economic factors.

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Table 3. Corn Scenario, if 10% of the Corn Acreage is Converted to Pasture.

Acreage and Production	Southern Coastal Plain MLRA			Southern Piedmont MLRA		
	Current	10% Converted to pasture	Change	Current	10% Converted to pasture	Change
Corn acres	1,071,434	964,291	-107,143	204,286	183,857	-20,429
Corn Production, bushels	99,838,038	89,854,234	-9,983,804	17,325,268	15,592,741	-1,732,527
Pasture, acres	5,159,865	5,267,008	107,143	3,988,549	4,008,978	20,429
Corn Production Costs						
Fertilizer and Lime	\$59,518,159	\$53,566,343	-\$5,951,816	\$11,348,087	\$10,213,279	-\$1,134,809
Seed, Herbicide, Insecticide	\$35,571,609	\$32,014,448	-\$3,557,161	\$6,782,295	\$6,104,066	-\$678,230
Fuel and Repairs	\$27,964,427	\$25,167,985	-\$2,796,443	\$5,331,865	\$4,798,678	-\$533,186
Total Variable Costs	\$175,393,746	\$157,854,371	-\$17,539,375	\$33,441,618	\$30,097,456	-\$3,344,162
Total Fixed Costs	\$94,254,049	\$84,828,644	-\$9,425,405	\$17,971,039	\$16,173,935	-\$1,797,104
Total Costs	\$269,647,795	\$242,683,015	-\$26,964,779	\$51,412,658	\$46,271,392	-\$5,141,266
Number of Beef Cows	923,889	995,318	71,429	887,358	900,977	13,619
Cattle Production Costs						
Pasture Establishment		\$4,715,381			\$899,063	
Annual Variable Costs	\$230,362,483	\$248,172,573	\$17,810,090	\$221,253,844	\$224,649,622	\$3,395,778
Annual Fixed Costs	\$96,731,178	\$104,209,788	\$7,478,609	\$92,906,383	\$94,332,299	\$1,425,916
Total Costs	\$327,093,662	\$352,382,361	\$25,288,700	\$314,160,226	\$318,981,921	\$4,821,694
Carbon Sequestered, lb		667,503,382			127,270,178	

Assumptions

Fertilizer & Lime, \$/acre	\$55.55
Seed, Herbicide, Insecticide, \$/acre	\$33.20
Fuel and Repairs	\$26.10
Total Variable Costs, \$/acre	\$163.70
Total Fixed Costs, \$/acre	\$87.97
Total Costs, \$/acre	\$251.67
Pasture Establishment, \$/acre	\$44.01
Cows/acre	1.5
Total Variable Costs, \$/cow	\$249.34
Total Fixed Costs, \$/cow	\$104.70
Total Costs, \$/cow	\$354.04
Carbon Sequestered, lb/acre	6,230

Table 4. Cotton Scenario, if 10% of the Cotton Acreage is Converted to Pasture.

	Southern Coastal Plain MLRA			Southern Piedmont MLRA		
	10% Converted		Change	10% Converted		Change
Acreage and Production	Current	to pasture		Current	to pasture	
Cotton acres	2,007,101	1,806,391	-200,710	101,979	91,781	-10,198
Cotton Production, bales	2,616,238	2,354,614	-261,624	118,850	106,965	-11,885
Pasture, acres	5,159,865	5,360,575	200,710	3,988,549	3,998,747	10,198
Cotton Production Costs						
Fertilizer and Lime	\$104,088,258	\$93,679,432	-\$10,408,826	\$5,288,631	\$4,759,768	-\$528,863
Seed, Herbicide, Insecticide	\$163,177,311	\$146,859,580	-\$16,317,731	\$8,290,893	\$7,461,803	-\$829,089
Scouting, BWEP	\$22,078,111	\$19,870,300	-\$2,207,811	\$1,121,769	\$1,009,592	-\$112,177
Fuel and Repairs	\$123,537,067	\$111,183,360	-\$12,353,707	\$6,276,807	\$5,649,127	-\$627,681
Defoliation	\$30,106,515	\$27,095,864	-\$3,010,652	\$1,529,685	\$1,376,717	-\$152,969
Total Variable Costs	\$584,788,947	\$526,310,053	-\$58,478,895	\$29,712,601	\$26,741,341	-\$2,971,260
Total Fixed Costs	\$239,386,936	\$215,448,243	-\$23,938,694	\$12,163,035	\$10,946,732	-\$1,216,304
Total Costs	\$824,175,884	\$741,758,295	-\$82,417,588	\$41,875,637	\$37,688,073	-\$4,187,564
Number of Beef Cows	923,889	1,057,696	133,807	887,358	894,157	6,799
Cattle Production Costs						
Pasture Establishment		\$8,833,252			\$448,810	
Annual Variable Costs	\$230,362,483	\$263,725,854	\$33,363,371	\$221,253,844	\$222,949,007	\$1,695,163
Annual Fixed Costs	\$96,731,178	\$110,740,743	\$14,009,565	\$92,906,383	\$93,618,196	\$711,813
Total Costs	\$327,093,662	\$374,466,597	\$47,372,936	\$314,160,226	\$316,567,203	\$2,406,976
Carbon Sequestered, lb		1,250,423,923			63,532,917	

Assumptions

Fertilizer & Lime, \$/acre	\$51.86
Seed, Herbicide, Insecticide, \$/acre	\$81.30
Fuel and Repairs	\$61.55
Scouting and BWEP, \$/acre	\$11.00
Defoliation, \$/acre	\$15.00
Total Variable Costs, \$/acre	\$291.36
Total Fixed Costs, \$/acre	\$119.27
Total Costs, \$/acre	\$410.63
Pasture Establishment, \$/acre	\$44.01
Cows/acre	1.5
Total Variable Costs, \$/cow	\$249.34
Total Fixed Costs, \$/cow	\$104.70
Total Costs, \$/cow	\$354.04
Carbon Sequestered, lb/acre	6,230

Table 5. Peanut Scenario, if 10% of the Peanut Acreage is Converted to Pasture.

Acreage and Production	Southern Coastal Plain MLRA			Southern Piedmont MLRA		
	Current	10% Converted to pasture	Change	Current	10% Converted to pasture	Change
Peanut acres	730,351	657,316	-73,035	18,980	17,082	-1,898
Peanut Production, lb.	1,731,653,013	1,558,487,712	-173,165,301	44,780,868	40,302,781	-4,478,087
Pasture, acres	5,159,865	5,232,900	73,035	3,988,549	3,990,447	1,898
Peanut Production Costs						
Fertilizer and lime/gypsum	\$26,913,434	\$24,222,091	-\$2,691,343	\$699,413	\$629,472	-\$69,941
Seed, inoculant	\$62,079,835	\$55,871,852	-\$6,207,984	\$1,613,300	\$1,451,970	-\$161,330
Herbicide, insecticide	\$65,731,590	\$59,158,431	-\$6,573,159	\$1,708,200	\$1,537,380	-\$170,820
Fuel and Repairs	\$35,268,650	\$31,741,785	-\$3,526,865	\$916,544	\$824,890	-\$91,654
Nematicide, fungicide	\$94,945,630	\$85,451,067	-\$9,494,563	\$2,467,400	\$2,220,660	-\$246,740
Total Variable Costs	\$300,963,040	\$270,866,736	-\$30,096,304	\$7,821,278	\$7,039,151	-\$782,128
Total Fixed Costs	\$101,825,536	\$91,642,983	-\$10,182,554	\$2,646,192	\$2,381,572	-\$264,619
Total Costs	\$402,788,577	\$362,509,719	-\$40,278,858	\$10,467,470	\$9,420,723	-\$1,046,747
Number of Beef Cows	923,889	972,579	48,690	887,358	888,623	1,265
Cattle Production Costs						
Pasture Establishment		\$3,214,275			\$83,531	
Annual Variable Costs	\$230,362,483	\$242,502,864	\$12,140,381	\$221,253,844	\$221,569,342	\$315,498
Annual Fixed Costs	\$96,731,178	\$101,829,028	\$5,097,850	\$92,906,383	\$93,038,863	\$132,480
Total Costs	\$327,093,662	\$344,331,893	\$17,238,231	\$314,160,226	\$314,608,205	\$447,979
Carbon Sequestered, lb		455,008,673			11,824,540	

Assumptions

Fertilizer & Lime, \$/acre	\$36.85
Seed, inoculant, \$/acre	\$85.00
Fuel and Repairs	\$48.29
Herbicide, insecticide, \$/acre	\$90.00
Nematicide, fungicide, \$/acre	\$130.00
Total Variable Costs, \$/acre	\$412.08
Total Fixed Costs, \$/acre	\$139.42
Total Costs, \$/acre	\$551.50
Pasture Establishment, \$/acre	\$44.01
Cows/acre	1.5
Total Variable Costs, \$/cow	\$249.34
Total Fixed Costs, \$/cow	\$104.70
Total Costs, \$/cow	\$354.04
Carbon Sequestered, lb/acre	6,230

Table 6. Soybean Scenario, if 10% of the Soybean Acreage is Converted to Pasture.

Acreage and Production	Southern Coastal Plain MLRA			Southern Piedmont MLRA		
	Current	10% Converted to pasture	Change	Current	10% Converted to pasture	Change
Soybean acres	1,551,914	1,396,723	-155,191	392,151	352,936	-39,215
Soybean Production, bushels	36,795,955	33,116,360	-3,679,596	9,483,751	8,535,376	-948,375
Pasture, acres	5,159,865	5,315,056	155,191	3,988,549	4,027,764	39,215
Soybean Production Costs						
Fertilizer and Lime	\$43,624,303	\$39,261,872	-\$4,362,430	\$11,023,365	\$9,921,028	-\$1,102,336
Seed, Inoculant, Fungicide	\$46,371,190	\$41,734,071	-\$4,637,119	\$11,717,472	\$10,545,725	-\$1,171,747
Herbicide, Insecticide	\$33,210,960	\$29,889,864	-\$3,321,096	\$8,392,031	\$7,552,828	-\$839,203
Fuel and Repairs	\$40,427,360	\$36,384,624	-\$4,042,736	\$10,215,534	\$9,193,980	-\$1,021,553
Total Variable Costs	\$205,566,528	\$185,009,876	-\$20,556,653	\$51,944,321	\$46,749,889	-\$5,194,432
Total Fixed Costs	\$110,635,949	\$99,572,354	-\$11,063,595	\$27,956,445	\$25,160,800	-\$2,795,644
Total Costs	\$315,892,095	\$284,302,885	-\$31,589,209	\$79,822,336	\$71,840,102	-\$7,982,234
Number of Beef Cows	923,889	1,027,350	103,461	887,358	913,501	26,143
Cattle Production Costs						
Pasture Establishment		\$6,829,974			\$1,725,857	
Annual Variable Costs	\$230,362,483	\$256,159,432	\$25,796,949	\$221,253,844	\$227,772,439	\$6,518,595
Annual Fixed Costs	\$96,731,178	\$107,563,538	\$10,832,360	\$92,906,383	\$95,643,597	\$2,737,214
Total Costs	\$327,093,662	\$363,722,970	\$36,629,309	\$314,160,226	\$323,416,036	\$9,255,809
Carbon Sequestered, lb		966,842,422			244,310,073	

Assumptions

Fertilizer & Lime, \$/acre	\$28.11
Seed, Inoculant, Fungicide, \$/acre	\$29.88
Fuel and Repairs	\$26.05
Herbicide, Insecticide, \$/acre	\$21.40
Total Variable Costs, \$/acre	\$132.46
Total Fixed Costs, \$/acre	\$71.29
Total Costs, \$/acre	\$203.55
Pasture Establishment, \$/acre	\$44.01
Cows/acre	1.5
Total Variable Costs, \$/cow	\$249.34
Total Fixed Costs, \$/cow	\$104.70
Total Costs, \$/cow	\$354.04
Carbon Sequestered, lb/acre	6,230

Table 7. Tobacco Scenario, if 10% of the Tobacco Acreage is Converted to Pasture.

Acreage and Production	Southern Coastal Plain MLRA			Southern Piedmont MLRA		
	Current	10% Converted to pasture	Change	Current	10% Converted to pasture	Change
Tobacco acres	145,502	130,952	-14,550	161,664	145,498	-16,166
Tobacco Production, lb.	324,710,762	292,239,686	-32,471,076	346,561,819	311,905,637	-34,656,182
Pasture, acres	5,159,865	5,174,415	14,550	3,988,549	4,004,715	16,166
Tobacco Production Costs						
Fertilizer and Lime	\$14,289,751	\$12,860,776	-\$1,428,975	\$15,877,021	\$14,289,319	-\$1,587,702
Herbicide, Insecticide	\$30,773,673	\$27,696,306	-\$3,077,367	\$34,191,936	\$30,772,742	-\$3,419,194
Plants	\$17,314,738	\$15,583,264	-\$1,731,474	\$19,238,016	\$17,314,214	-\$1,923,802
Nematocide, Fungicide	\$17,751,244	\$15,976,120	-\$1,775,124	\$19,723,008	\$17,750,707	-\$1,972,301
Total Variable Costs	\$289,727,947	\$260,755,153	-\$28,972,795	\$321,910,207	\$289,719,186	-\$32,191,021
Total Fixed Costs	\$112,448,311	\$101,203,480	-\$11,244,831	\$124,938,789	\$112,444,910	-\$12,493,879
Total Costs	\$402,176,258	\$361,958,632	-\$40,217,626	\$446,848,996	\$402,164,096	-\$44,684,900
Number of Beef Cows	923,889	933,589	9,700	887,358	898,136	10,778
Cattle Production Costs						
Pasture Establishment		\$640,354			\$711,483	
Annual Variable Costs	\$230,362,483	\$232,781,115	\$2,418,631	\$221,253,844	\$223,941,131	\$2,687,287
Annual Fixed Costs	\$96,731,178	\$97,746,782	\$1,015,604	\$92,906,383	\$94,034,797	\$1,128,415
Total Costs	\$327,093,662	\$330,527,897	\$3,434,235	\$314,160,226	\$317,975,928	\$3,815,702
Carbon Sequestered, lb		90,647,746			100,716,672	

Assumptions

Fertilizer & Lime, \$/acre	\$98.21
Herbicide, Insecticide, \$/acre	\$211.50
Plants	\$119.00
Nematode, Fungicide, \$/acre	\$122.00
Total Variable Costs, \$/acre	\$1,991.23
Total Fixed Costs, \$/acre	\$772.83
Total Costs, \$/acre	\$2,764.06
Pasture Establishment, \$/acre	\$44.01
Cows/acre	1.5
Total Variable Costs, \$/cow	\$249.34
Total Fixed Costs, \$/cow	\$104.70
Total Costs, \$/cow	\$354.04
Carbon Sequestered, lb/acre	6,230